

## **REMARKS**

Claims 1-29 are pending in the present application.

### **Obviousness-Type Non-statutory Double Patenting Rejection**

The Examiner asserts claims 1-9, and 14-25 stand provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-21 of copending application 10/775,426. Although the claims are not identical, they are not patentably distinct because the specification of the copending application teaches the limitation that is recited in the present claims and that it would have been obvious. Applicant traverses this rejection because reliance on description contained in Applicant's co-pending (and filed on the same day) application specification is not grounds for an obviousness-type double patenting rejection. It is a comparison of the claims that may be grounds for an obviousness-type double patenting rejection. Thus, Applicant submits the Examiner has not provided an appropriate analysis of the claims

However to expedite prosecution, Applicant respectfully requests this rejection be held in abeyance until either the copending application or the present application is allowed, at which time a Terminal Disclaimer may be filed in this or the still pending application. (See MPEP §

### **Objection to the Abstract of the Disclosure**

The Examiner has objected to the abstract. The Examiner asserts the abstract in the disclosure is not corresponded to in the disclosure in the specification because and the Abstract are in conflict. Specifically, the Examiner asserts "the specification once discloses a storage cache system includes a first metadata storage and a second metadata storage while the abstract specifically discloses a cache metadata storage include a cache, a first metadata storage and a second metadata storage."

Applicant respectfully disagrees and further submits the abstract, as shown below, in fact discloses a storage system including a cache, a first metadata storage and a second

metadata storage. Applicant submits the specification describes several embodiments, one of which is identified in the abstract of the disclosure. Applicant respectfully directs the Examiner to reread the abstract and especially paragraphs [0020] through [0022] of the specification, of which pertinent parts are copied below for the Examiner's reference.

More particularly the abstract discloses

"A storage system includes a cache and a collection of metadata, organized by their associations with regard to the data they represent. In one embodiment, the cache stores data blocks in a first plurality of locations. A first metadata storage stores metadata including block addresses of data blocks within the cache. A second metadata storage includes a second plurality of locations, each for storing metadata including a block address identifying a corresponding data block within the cache." (Emphasis added)

Paragraph [0022] discloses

"Accordingly, in the illustrated embodiment, the metadata of cache system 55 is arranged in a two-level hierarchical structure. The two-level hierarchy includes first-level metadata stored within metadata storage 220 and second-level metadata stored within metadata storage 230."

From the foregoing, it is clear to Applicant the abstract more than adequately enables the public to quickly determine the nature and gist of the patent from a cursory inspection. Applicant submits there is no requirement to specifically identify in the abstract each and every embodiment, feature and/or detail in the specification. Accordingly Applicant respectfully requests the Examiner withdraw the objection to the abstract.

#### Rejection under 35 U.S.C. §112, 1<sup>st</sup> Paragraph

Claims 1, 11, 18, and 27 are rejected under 35 U.S.C. §112, 1<sup>st</sup> paragraph, as failing to comply with the enablement requirement. Applicant respectfully traverses this rejection.

More particularly, with respect to claims 1 and 18, the Examiner asserts "the specification never once disclosed a cache configured to store a plurality of data blocks in a first plurality of locations, wherein said cache is a non-volatile storage except the

abstract and the Summary disclosures.” The Examiner further asserts “claims 1 and 18 further disclosed a limitation: “at least one of said second plurality of locations is further configured to store a second pointer to another of said second plurality of locations that stores metadata corresponding to a related data block.” The Examiner unable to find anywhere in the specification disclosure except the abstract and the Summary disclosed the limitation...”

Applicant respectfully requests the Examiner reread the specification to find the support for the limitation. Applicant directs the Examiner’s attention to at least FIG. 6 and paragraphs [0040] and [0042] of the specification. An excerpt is shown below for the Examiner.

Paragraph [0040] discloses

“...an alternative embodiment of the fully associative metadata structure of the storage cache system of FIG. 2 is shown. Metadata structure 600 is a collection of cache descriptors that describes corresponding data blocks stored in data storage 220. The cache descriptors are arranged into a cache descriptor group. The cache descriptor group consists of a number of cache descriptors where each of the cache descriptors points to data blocks residing anywhere in data storage 220. In addition, as will be described further below, cache descriptors pointing to related data blocks may be chained together by pointing to other cache descriptors.” (Emphasis added)

Paragraph [0042] discloses

“...each cache descriptor points to and includes information describing a corresponding data block stored anywhere within data storage 240. For example, cache descriptor 620 points to data block 625, cache descriptor 630 points to data block 635, and so on. In addition, each cache descriptor may point to another cache descriptor that points to a data block that is related to the first data block.” (Emphasis added)

Accordingly, Applicant submits there is ample support for the claimed limitations, and respectfully request the Examiner withdraw the rejection of claims 1 and 18 under 35 U.S.C. §112, 1<sup>st</sup> paragraph.

With regard to the rejection of claims 11 and 27 under 35 U.S.C. §112, 1<sup>st</sup> paragraph due to duplication of essential working parts, Applicant is confused by this rejection. Applicant fails to understand the rationale behind this § 112 rejection. Applicant respectfully submits the addition of pointers as recited in the claims is not merely a duplication of identical parts as the Examiner is suggesting. To the contrary, the limitation recited in the claims regarding the third pointer further limits the claims, as it creates a chain of pointers, and not merely a duplicity of identical pointers. This is not the same as reciting a duplicate widget that does an identical task as another widget. Accordingly applicant respectfully requests the Examiner withdraw the rejection of claims 11 and 27 under 35 U.S.C. §112, 1<sup>st</sup> paragraph.

Rejection under 35 U.S.C. §103(a)

Claims 1-9, 11, 13-25, 27, and 29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Coulson (U.S. Patent Publication No. 2003/0046493) (hereinafter "Coulson") in view of Koseki et al. (U.S. Patent No. 6,732,124) (hereinafter "Koseki"). Applicant respectfully traverses this rejection and requests reconsideration of the claims in light of the following remarks.

Claims 10, 12, 26, and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Coulson in view of Koseki, and in further view of Applicant's admitted prior art (AAPA). Applicant respectfully traverses this rejection and requests reconsideration of the claims in light of the following remarks.

Applicant's claim 1 recites

"A storage system comprising:  
a cache configured to store a plurality of data blocks in a first plurality of locations, wherein said cache is a non-volatile storage;  
a first metadata storage including a plurality of entries configured to store metadata including block addresses of data blocks within said cache, wherein said first metadata storage is a non-volatile storage;  
and  
a second metadata storage including a second plurality of locations each configured to store metadata including a block address identifying

a corresponding data block within said cache and further including a first pointer to said corresponding data block within said cache, wherein said second metadata storage is a volatile storage; wherein at least one of said second plurality of locations is further configured to store a second pointer to another of said second plurality of locations that stores metadata corresponding to a related data block.” (Emphasis added)

The Examiner asserts Coulson teaches each and every limitation recited in claim 1 with the exception of one limitation. The Examiner acknowledges that Coulson does not teach “a first metadata storage including a plurality of entries configured to store metadata including block addresses of data blocks within said cache, wherein said first metadata storage is a non-volatile storage...” However the Examiner asserts Koseki teaches the limitation and that it would have been obvious to combine the two references because it would be an advantage to combine them, and the motivation of doing so “is to enhance the system of Coulson by enabling the metadata to be stored in another non-volatile metadata storage. As being a non-volatile storage, the metadata will not be destroyed once the system is shut off.”

However, Coulson teaches at paragraph [0017]

“FIG. 2 shows an example cache line layout for 512 bytes of data 210 with metadata 220. The metadata 220 may include, as shown, an error correction code (ECC) 230 to recover the data 210, a tag or address 240 to indicate the data to which the metadata corresponds, and flags 250 to indicate if the cache line is valid and/or dirty. The metadata 220 also may include a hit count 260 and the usage timeframe indicator 270, used to implement the invention.” (Emphasis added)

From the foregoing, it is clear to Applicant that Coulson teaches a cache memory that may be either volatile or non-volatile storage. In addition, the only time Coulson mentions metadata in paragraphs [0013-0015] is when Coulson mentions that LRU logic updates the metadata. Further, it is clear from FIG. 2 and the description above, the metadata is stored with the cache line of data in the cache memory itself, and that there is no other metadata storage unit. As such, it is clear that if the cache memory is non-volatile, then by definition the metadata storage is non-volatile. Likewise, if the cache memory is volatile, then the metadata storage is also volatile. It is also clear that there is

no pointer in the metadata 220 to the data, or a pointer to other metadata, since the cache line includes both the metadata and the data.

Accordingly, Applicant submits Coulson **does not teach or disclose** “a second metadata storage including a second plurality of locations each configured to store metadata including a block address identifying a corresponding data block within said cache and further including a first pointer to said corresponding data block within said cache, wherein said second metadata storage is a volatile storage,” or “wherein at least one of said second plurality of locations is further configured to store a second pointer to another of said second plurality of locations that stores metadata corresponding to a related data block” as recited in claim 1.

Koseki is directed to a file system restoration wherein Koseki uses metadata transaction log files to restore and update metadata files stored in the system storage alongside the data files. Koseki teaches at col. 1, lines 12-15 “More particularly, the present invention relates to a data processing system which can recover from system failures by using log records to restore the consistency of its file system structure...”

Koseki also teaches at col. 15 lines 13-15

“The hard disk drives 231 to 233 store a variety of program and data files, together with metadata for file management and transaction log information.”

From the foregoing, it appears Koseki teaches storing the data files and the metadata within the same physical storage. This is counter-productive in a highly reliable system. More particularly, Applicant’s invention is directed to solving problems related to restoring data in high RAS systems.

Moreover, not only does the combination of Coulson and Koseki not teach the combination of features recited in Applicant’s claim 1, Applicant submits there is no motivation found in either reference to combine the references as the Examiner has

suggested. The Examiner has asserted there is a motivation. However, Applicant respectfully submits the fact that references can be combined is not sufficient to establish a prima facie case of obviousness. (See MPEP §2143.01 (III) pg 2100-137) Specifically, from above, Koseki teaches relying on log files of metadata transactions to restore the file system. Koseki makes no mention of the fact that the metadata is stored in a non-volatile storage to be particularly advantageous. In addition, Coulson does not appear to be concerned with providing a reliable system. Thus, for the foregoing reasons and others, Applicant disagrees with the examiner's allegations of a motivation to combine the references.

Accordingly, Applicant submits claim 1, along with its dependent claims, patentably distinguishes over Coulson in view of Koseki for the reasons given above.

Applicant's claim 18 recites features that are similar to the features recited in claim 1. Accordingly, for at least the reasons given above regarding claim 1, Applicant submits claim 18, along with its dependent claims, patentably distinguishes over Coulson in view of Koseki.

**CONCLUSION**

Applicant submits the application is in condition for allowance, and an early notice to that effect is requested.

If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5681-73300/SJC.

Respectfully submitted,

  
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